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ORIGINAL ARTICLE



The Role of Siblings in Adolescent Delinquency Next to Parents, School, and Peers: Do Gender and Age Matter?

Twan Huijsmans¹  • Veroni I. Eichelsheim² • Frank Weerman^{2,3} • Susan J. T. Branje⁴ • Wim Meeus^{4,5}

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Abstract

Purpose This study aimed to explore whether and how sibling delinquency affects adolescent delinquency, over and beyond the effects of other social domains such as parents, school, and peers, and whether this sibling effect is time-varying over the course of adolescence.

Methods Six waves of data from the “Research on Adolescents Development And Relationships-Younger cohort” (RADAR-Y) were analyzed using hierarchical linear modeling (HLM) techniques. Besides an overall model, separate models were tested for the periods of early and late adolescence respectively, in which we accounted for differences in sibling pair composition with regard to gender and age.

Results Sibling’s delinquency was shown to be positively related to adolescent delinquency in early adolescence, only for sister and mixed-sex sibling pairs, but these effects disappeared in later adolescence. In brother pairs, an opposite pattern was observed: sibling delinquency was not related to delinquent behavior in early adolescence, whereas it was in late adolescence.

Conclusion Sibling’s delinquency explains part of adolescents’ delinquency in early adolescence, beyond the influence exerted by peers, parents, and school. Analyzing early and late adolescence in separate models provided a more detailed insight in the influence of sibling’s delinquency over time, and controlling for sex composition reveals that development of sibling similarity in delinquency differs between brothers, sisters, and mixed-sex sibling pairs.

In the present study, data of the RADAR Young study were used. RADAR-Y has been financially supported by main grants from the Netherlands Organization for Scientific Research (GB-MAGW 480-03-005; GB-MAGW 480-08-006), and Stichting Achmea Slachtoffer en Samenleving (SASS), a grant from the Netherlands Organization for Scientific Research to the Consortium Individual Development (CID; 024.001.003), and various other grants from the Netherlands Organization for Scientific Research (NWO), the VU University of Amsterdam and Utrecht University. All syntax and output files are available from the corresponding author upon request.

✉ Twan Huijsmans
t.m.huijsmans@vu.nl

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Adolescents' lives take place in multiple social domains, in particular the family, school, and the peer group (e.g., [1–3]). Within these social domains, adolescents have the opportunity to learn how to form, shape, and maintain different social bonds with important others, and to adapt norms and values from them. This is often referred to as a process of socialization [4]. Each of these social domains is likely to affect adolescents' functioning and behavior, including delinquency. There is a large body of literature documenting associations between delinquency and various aspects of parents and family functioning [5–7], the school [8, 9], and peers [10–12].

With regard to the family domain, there is a large body of literature documenting associations between delinquency and parenting, parent-child relationships, and family functioning. However, it is becoming increasingly clear that sibling influences in adolescent development cannot be overlooked in explaining adolescent development (e.g., [13, 14]) and antisocial behavior (e.g., [15–18]). It also appears that social relationships with siblings and siblings' behaviors may play a significant role in the development of adolescents' delinquent behavior, even after controlling for peer influence [19], bonds to parents [20, 21], or both [22, 23]. Defoe et al. [23] analyzed part of the data from the same sample that was used in the current study and concluded that sibling influence on delinquency may be just as likely as peer influence, but only from older to younger siblings. Defoe et al. [23] also controlled for other social domains.

To our knowledge, however, few studies specifically investigated possible changes in the effects of siblings next to other social domains over the course of adolescence. That is unfortunate, because the role and relative importance of social domains change fundamentally during adolescence [24–26]. For example, attachment to parents tends to decrease [27] and relationships with parents become more egalitarian over the course of adolescence [28]. Peer relationships become increasingly important in early and middle adolescence, and adolescents increasingly experience pressure to adopt norms, values, and behavior of their friends [26, 29]. According to *interactional theory* and the *life course perspective* in criminology, relative associations between various social domains and delinquent behavior may change over time (e.g., [3, 30, 31]). In the life course perspective, this is referred to as “age-graded informal social control” [32].

Until now, few studies have investigated how associations between parents, school, and peers on the one hand and delinquent behavior on the other hand change over the years when young people grow up (exceptions are, e.g., [7, 33]). And as far as we know, only a few studies scrutinized potential changes in sibling influences on delinquency over the life course. Those studies that did, roughly compared sibling similarity in adolescence to sibling similarity in either young adulthood [17, 34] or preadolescence [35], with a time lag of 2, 3, or 5 years between measurements. Sibling similarity in alcohol use and delinquency were found to be stronger in adolescence, compared to young adulthood [17, 34], suggesting that sibling influences may decrease as adolescents grow older. Moreover, Walters [35] found that sibling delinquency is a stronger predictor for delinquency in the period between adolescence and young adulthood,

compared to the period between childhood and adolescence. Altogether, this implies that sibling delinquency becomes an important predictor for delinquent behavior in adolescence, and its influence on delinquency decreases afterwards. Therefore, in the current study, we want to expand these insights by providing a detailed assessment of sibling influences during a 6-year period *within* adolescence (approximately covering ages 13–18) with annual measurements, and by comparing the period of early and late adolescence. In doing so, we simultaneously take into account time-varying associations between other social influence domains (i.e., parents, peers, and school) and delinquency, and the role of gender and age.

Six waves of longitudinal data from the “Research on Adolescents Development And Relationships-Younger cohort” (RADAR-Y) were used to test our hypotheses. These data were analyzed using hierarchical linear modeling (HLM) techniques, building on the extensive model and insights provided by Jang [33]. The central question of our study is whether the relative influence of siblings’ behavior on delinquency changes over the course of adolescence, like the influence of parents, peers, and school does according to previous research.

Theoretical Framework

Social Domains and Delinquency

Interactional theory was developed by Thornberry [30, 31], who aimed to integrate and elaborate on previous theoretical perspectives, in particular, social control [36] and social learning theory [37]. One of the new elements Thornberry wished to incorporate was to pay specific attention to developmental patterns in influence of social domains on delinquency. Therefore in the current study, we deliberately take the interactional theory as a starting point to formulate hypotheses on time-varying associations between adolescents’ delinquency and their relationships to parents, peers, and school, before we turn to how developmental patterns in the influence of sibling delinquency might fit in this framework. Interactional theory hypothesizes that adolescents experience increased behavioral freedom when bonds to conventional society are weaker, which could allow them to deviate from conventional norms and activities. Bonds to parents and family, and commitment to and success in school are representations of these social bonds for adolescents [31].

In Thornberry’s interactional theory, the bond between parents and children are of specific importance. What he calls “attachment” to parents is defined as “the affective relationship between parent and child, communication patterns, parenting skills such as monitoring and discipline, parent-child conflict, and the like” ([30], p. 866). Similarly, the bond with or commitment to school he defines as “the stake in conformity the adolescent has developed and includes such factors as success in school, perceived importance of education, attachment to teachers, and involvement in school activities” ([30], p. 866).

According to interactional theory, adolescents who have weak social bonds to parents and school do not *necessarily* become seriously and persistently engaged in delinquent behavior. For this to happen, they need a social environment that encourages this, which may be provided by association with delinquent peers [38]. Continuation of

delinquent behavior through adolescence is therefore more likely to happen when adolescents are embedded in a social network where antisocial behavior is reinforced and/or positive attitudes toward this behavior exist.

Relative Associations over Time in Interactional Theory

Thornberry's *interactional theory* proposes that the relative influence of the three mentioned social domains varies between early, middle, and late adolescence [38]. The changing roles and relative importance of family, school, and peers over time is associated with striving for autonomy, spending more time outside the family, and more time with friends and at school. Bonds to parents are supposed to be more important in early adolescence, compared to middle and late adolescence. During middle adolescence, youths spend more time in school and with their peers, which implies that the relative influence of parents decreases, and the school and peer domains become more important, compared to early adolescence. In the final stage of adolescence, the influence of peers and the school is expected to decrease again, since newly emerging commitments to conventional activities and new social bonds (e.g., employment or romantic partners) partly take over the role of peers and the school [33].

Jang [33] tested the time-varying associations between the family, school, and peer domains on the one hand and delinquency on the other hand that are assumed in interactional theory all together in one model. His findings provide support for age-varying effects of commitment to school and association with delinquent peers. The relationship between bonds to family and delinquency, however, remained stable and significant throughout the whole period of adolescence [33]. A meta-analysis on the association between attachment to parents and delinquency revealed that the strength of the association weakens with increasing age [7]. This discrepancy between Jang's [33] findings on the one hand and Hoeve et al.'s [7] findings and interactional theory's hypotheses on the other hand might be due to the fact that Jang's [33] operationalization implicitly also included the influence of other family members, like siblings. This underlines the importance of explicitly disentangling the relative influences over time of parents and siblings.

Siblings and Delinquency over the Course of Adolescence

Siblings share a long-term and emotionally close relationship, and are therefore particularly likely to influence each other's behavior and to act as delinquent role models [20]. A large body of research in developmental psychology focuses on how siblings positively and negatively influence each other's behavioral adjustment (for a review, see [13, 39]. Findings from this research field suggest that adolescents' behaviors are indeed related to behaviors of their siblings. In explaining adolescents' delinquency, the role of sibling influence received relatively little attention thus far. There are a few classic and well-known studies in criminology that emphasized the role of siblings, in particular older brothers, as mentors in crime [40, 41]. However, there is only a limited amount of recent literature. A few studies reported older delinquent sibling's behavior to be a significant risk factor for adolescents' delinquent behavior and substance use (e.g., ([16, 18–20, 22, 23, 42]; see also [13]). Others reported bi-directional associations between older and younger siblings [17, 34]. Further, sibling

similarity in delinquent behavior seems to be higher in same-sex sibling pairs, compared to mixed-sex sibling pairs, which might be explained by same-sex siblings feeling closer to each other than opposite-sex siblings [43]. Some studies report the strongest sibling similarity in delinquency for brother-brother pairs [44], and others for sister-sister pairs [16]. It is yet unknown, however, to which extent these relations and influences change over the course of adolescence.

Based on interactional theory and the available empirical literature, competing hypotheses may be formulated about differential associations between sibling delinquency and delinquent behavior during adolescence. On the one hand, separation and individuation processes between siblings may be similar to processes of individuation and separation from parents and family that is assumed within interactional theory, as the amount of time siblings spend in leisure activities with each other decreases over the course of adolescence [13]. When social interaction between siblings decreases over time, siblings might be less aware of delinquent behaviors of other siblings, which would imply that there are less opportunities for social learning. However, a decrease of time siblings spent together may imply that the similarity between the delinquent behavior of one sibling and the delinquent behavior of the other decreases over the course of adolescence (see also [17]). This line of reasoning corresponds with a diminishing influence of the family over the course of adolescence, and increasing amounts of time adolescents spent outside the family, with peers and at school.

On the other hand, relative developmental differences between siblings may diminish over the course of adolescence, so that different-age siblings become more alike as they get older. This situation facilitates a better opportunity for social comparison between siblings [13]. Social comparison means that adolescents evaluate their own behavior by comparing it to their sibling's behavior. When, for example, siblings' interests become more alike, adolescents may compare themselves more strongly to their siblings, and become stronger influenced by their sibling's behavior in late adolescence compared to early adolescence. Moreover, warmth and intimacy within the sibling relationship may increase, and conflict and rivalry decrease when siblings get older ([45]; see also [17]). In sum, an increase in similarity between siblings and more warmth and intimacy in the sibling relationship would imply that the association between the delinquent behavior of one sibling and the delinquent behavior of the other strengthens over the course of adolescence.

Recent research that compared sibling influence in adolescence to sibling influence in young adulthood seems to be more in line with the first line of reasoning than with the second. Sibling similarities in alcohol use and delinquency were found to be stronger in adolescence, compared to young adulthood [17, 34], suggesting that sibling influences decrease as adolescents grow older.

Research Aim and Hypotheses

The purpose of this study is to investigate siblings as an influence domain for adolescents' delinquent behavior among other social domains and to provide a test and specification of sibling influences during different periods in adolescence.

Our first three hypotheses are derived from existing assumptions from interactional theory regarding the associations between bonds to parents, commitment to school, and association with delinquent peers on the one hand and delinquent behavior on the other

hand: bonds to parents will be negatively related with delinquent behavior (H1); commitment to school will be negatively related with delinquent behavior (H2); association with delinquent peers will be positively related with delinquent behavior (H3). Our next hypothesis concerns the main effect of sibling delinquency: Siblings' delinquent behavior will be positively related with adolescents' delinquent behavior (H4). Our next two hypotheses reflect the competing possibilities regarding the time-varying association between sibling delinquency and delinquent behavior: the association between sibling delinquency and delinquent behavior weakens over the course of adolescence (H5a); the association between sibling delinquency and delinquent behavior strengthens over the course of adolescence (H5b). Our final two hypotheses reflect the moderating effect of the composition of the sibling dyad: the association between sibling delinquency and delinquent behavior is stronger when the sibling is older than the respondent (H6a), and when the sibling is of the same sex as the respondent (H6b).

Methods

Data

The RADAR-Y project is a longitudinal cohort study with a full-family design, in which target respondents were recruited in their final year of primary school. Through them, parents and one best friend were approached. Parents were asked to put one sibling forward to participate in the research. In wave 1, which was employed when the target respondents were in the first year of secondary school, data were collected from 522 target respondents (57% male), their parents, their siblings, and their best friends. This multi-informant design makes the data particularly suitable for testing our hypotheses, since we have direct measurements for the target respondent's delinquent behavior, as well as for their sibling's and best friend's delinquent behavior, together with detailed information on the respondent's relationship with parents and commitment to school. Adolescents who scored high on problem behavior in the last year of elementary school (based on teacher reports) were oversampled [46]. However, respondents came from relatively "well-functioning" and intact families, since 89% came from families with a medium or high socioeconomic status (SES) [23], and 95% of sibling pairs consisted of fully biologically related siblings. Questionnaires were administered by a trained research assistant, who visited the respondents' homes.

Six waves of data are included in the current study. Data collection started when respondents were in the first year of secondary school and on average 13 years old ($M = 13.03$, $SD = 0.05$). Their best friends were approximately the same age ($M = 13.17$, $SD = .84$), and their siblings were in general older ($M = 14.92$, $SD = 3.33$). The attrition rate is relatively low, since 86.02% of target respondents who participated in wave 1 still participated in wave 6. For 449 respondents, a best friend participated in wave 1, which gradually decreased to 395 in wave 6. Between every pair of subsequent waves, approximately 20% of respondents mentioned a different best friend. We only analyzed data from respondents who had a participating sibling in wave 1, and we dropped all other observations. For 417 respondents, a sibling participated in wave 1, and this gradually decreased to 360 in wave 6. Only for 4.60% of target respondents the participating sibling changed over all waves, for all other target respondents the same sibling participated across waves.

The respondents who dropped out of the study ($M = 1.112$, $SD = 1.001$) scored significantly higher on delinquent behavior at wave 1 than those who stayed in ($M = 0.900$, $SD = 0.953$); $t(492) = 2.098$, $p = .018$, and they were also more likely to come from low socioeconomic status families ($M = 0.167$, $SD = 0.028$), compared to those who stayed in ($M = 0.082$, $SD = 0.015$); $z = 2.920$, $p = .004$. This could imply that relatively well-behaving adolescents from relatively well-functioning families are over-represented at later waves, compared to the earlier waves, which should be noted when interpreting the results.

Measurement

Delinquent Behavior (of Respondents, Siblings, and Best Friends) Delinquency was measured similarly across respondents, siblings, and best friends, using 30 items based on the International Self-Report Delinquency Study (ISRD) [47]. In this way, our operationalization of friends' and siblings' delinquency did not suffer from the projection bias that is connected with perceived measures of peer delinquency (see, e.g., [48]). In our delinquency measures, each item represents a delinquent act, and respondents (target respondent, friends, and siblings) could report whether or not they engaged in this behavior in the past 12 months. Seriousness of the items varies from relatively minor acts, like defacing someone's property and stealing something worth less than 5 euros, to more serious delinquent acts, like threatening or injuring someone with a weapon, burglary, and selling hard drugs. A variety scale was constructed from these items, indicating how many of the 30 delinquent acts a respondent performed. This measure does not account for the frequency of engaging in these behaviors, but the advantage is that it is not biased toward less serious crimes that occur more often. Bendixen et al. [49] found that the variety scale showed higher internal consistency, higher stability over time, bigger group differences, and stronger associations with conceptual-related variables than a frequency scale. Therefore, practical, methodological, and conceptual arguments favor use of a variety measure over a (log-transformed) frequency measure ([49]; see also [50]). As a robustness check, we performed our analyses using a delinquency frequency scale instead of the variety scale, but we did not find any substantial differences in the results.

Reliability of these scales is acceptable in each wave. Cronbach's alpha ranges between 0.76 and 0.92 for target respondents, between 0.82 and 0.89 for best friends, and between 0.80 and 0.82 for siblings. However, distribution of the variety scales is relatively skewed. A square root transformation on the variety scale scores was performed, which solved this problem to a large extent (e.g., in wave 1: for target adolescents skewness = 0.930, kurtosis = 4.067, for best friends skewness = 0.486, kurtosis = 2.520, and for siblings skewness = 0.772, kurtosis = 3.018).

Bonds to Parents Bonds to parents were operationalized as support and warmth adolescents receive from both parents. This was measured using the support subscale (eight items) of the Network of Relationships Inventory (NRI; [51]). We believe that it does at least capture an important part of the concept that Thornberry labeled as attachment to parents, namely the affective relationship and the extent to which parents are able to provide social support when necessary. It should be acknowledged that the extent to which parents are able to monitor children's behavior, another important mechanism for why bonds to parents might be related to delinquency, is not covered by this operationalization. Target respondents

answered to eight items with five answer categories (1 = little to not at all, 5 = as much as possible) on support they received from their mother and eight items on support they received from their father separately. An example item for mother's support is: "Does your mother admire and respect you?". Other items reflect for example the extent to which the mother appreciates the things the respondent does, the extent to which the respondent cares about his/her mother (and vice versa), the extent to which the mother teaches the respondent to find out and solve things him/her-self, and to what extent the respondent shares secrets and personal feelings with his/her mother. The same items were used for measuring warmth and support from the father. Reliability of the support and warmth scale for the mother, as well as for the father, is acceptable in every wave. Cronbach's alpha ranges between 0.78 and 0.85 across waves for mother's support and warmth, and between 0.82 and 0.89 for father's support and warmth. When data on both father and mother support and warmth were present, both measures were combined into a parental support and warmth-scale, equaling the mean of the father and mother scale. When only mother's (or father's) support and warmth was measured, the parental support and warmth-scale equals the score on the mother's (or father's) scale. Scale scores were centered around the mean before performing the analyses.

Commitment to School A school commitment-scale was constructed by combining scores on five items. An example item is: "How well did you do your homework in the past week?". Other items measure perceived school performance, bonds to classmates and teacher, and how well the respondent likes school. Respondents could answer to these questions using ten answer categories, higher scores indicating higher school commitment. Reliability of the commitment to school-scale is acceptable, Cronbach's alpha varying between 0.74 and 0.80 across waves. Scale scores were centered around the mean before performing the analyses.

Sibling Dyad Composition We constructed several dummy variables to measure the composition of the sibling dyad. The first dummy variable indicates whether the target respondent is older than the sibling (1 = yes; 0 = no). The second and third dummy variables are related to gender composition of the sibling dyad. One dummy variable indicates whether the sibling dyad is a brother-brother pair (1 = yes; 0 = no), and another dummy variable indicates whether the sibling dyad is a sister-sister pair (1 = yes; 0 = no). Mixed-sex sibling pairs are used as a reference category. In wave 1, 51% of siblings dyads consisted of two siblings of the same sex, 26% were brother-brother pairs, and 25% were sister-sister pairs. Then, 70% of siblings were older than the respondent.

Control Variables In all models, the effects on delinquent behavior were controlled for gender and socioeconomic status (SES) of the parents. Gender was included as a control variable, using a dichotomous variable *male* (0 = no, 1 = yes). SES was included as a dichotomous variable *low SES* (0 = medium or high family SES, 1 = low family SES) (Table 1).

Analytical Strategy

Hierarchical linear modeling (HLM) with two levels of analysis was used to test our hypotheses. Measurement at each wave is the lower-level unit of analyses (the within-

Table 1 Descriptive statistics per wave

Variable	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5		Wave 6	
	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>
Time-varying variables												
Target delinquency	0.95 (0.97)	492	0.68 (0.92)	480	0.74 (0.97)	472	0.66 (0.91)	457	0.53 (0.80)	436	0.45 (0.85)	443
Friend delinquency	1.15 (1.02)	436	0.99 (1.04)	412	1.02 (1.03)	414	0.91 (0.99)	410	0.86 (1.00)	388	0.73 (1.02)	361
Sibling delinquency	0.88 (0.94)	410	0.79 (0.91)	391	0.73 (0.88)	389	0.61 (0.83)	377	0.59 (0.83)	357	0.41 (0.72)	351
Parental support	3.76 (0.49)	520	3.66 (0.53)	491	3.57 (0.55)	476	3.50 (0.56)	462	3.50 (0.60)	444	3.47 (0.58)	448
School commitment	7.16 (1.44)	516	6.74 (1.45)	483	6.63 (1.39)	474	6.47 (1.38)	456	6.50 (1.41)	441	6.41 (1.43)	428
Sibling older	0.70 (–)	436	0.70 (–)	436	0.70 (–)	436	0.70 (–)	433	0.70 (–)	431	0.70 (–)	428
Age-difference	3.05 (1.80)	436	3.05 (1.83)	436	3.02 (1.81)	436	3.03 (1.83)	433	3.04 (1.82)	431	3.04 (1.81)	428
Brother pair	0.26 (–)	414	0.27 (–)	400	0.26 (–)	411	0.26 (–)	396	0.26 (–)	366	0.27 (–)	357
Sister pair	0.25 (–)	414	0.25 (–)	400	0.25 (–)	411	0.25 (–)	396	0.25 (–)	366	0.24 (–)	357
Mixed-sex pair	0.49 (–)	414	0.48 (–)	400	0.49 (–)	411	0.49 (–)	396	0.49 (–)	366	0.49 (–)	357
Time-constant control variables												
Male	0.56 (–)	522										
Low SES	0.11 (–)	514										

level), and individuals are the higher-level unit of analyses (the between-level). Since the observations per wave are clustered within individuals, it cannot be assumed that error terms are independent. HLM accounts for this non-independence, so that standard errors are not biased downwards, preventing us from drawing incorrect conclusions [52]. HLM divides the total variance in the outcome variable into between-person and within-person variation, which makes this method suitable for examining between-individual differences and within-individual development simultaneously. These hierarchical linear models were performed in Mplus, using maximum likelihood estimation with robust standard errors (MLR) [53]: an estimation method that is robust to non-normality and non-independence of observations, and can easily handle missing values on the outcome variable in longitudinal analysis, since it does not assume balanced data.

Three sets of models are analyzed in the current study. The first set of models includes the total period of six waves to see trends in relationships over 6 years in adolescence. The second set of models covers the period of early adolescence (wave 1–3), and the third set covers the period of middle to later adolescence (wave 4–6) respectively. This is done to perform a detailed test of the assumed time-varying association between siblings' delinquency and respondents' delinquency in early and late adolescence.

For each set of models, the same steps were followed. In step (a), hypotheses 1, 2, and 3 were evaluated. This includes best friend's delinquency, parental support, and warmth and school commitment as explanatory variables, next to the control variables gender and SES, the random intercept of delinquent behavior, and a random slope for the time (wave 1 = 0, wave 2 = 1... wave 6 = 5) variable. Subsequently, interaction effects between time and each of the three explanatory variables were included to see whether their effects on delinquency are time varying. The effect of commitment to school and parental support and warmth did not significantly interact with time in any model, so these interaction terms were excluded from all models presented in the results section. In step (b), the effect of sibling delinquency was added to the model that resulted from step (a), in order to test hypothesis 4. In step (c) of model 1, an interaction effect was included between the sibling delinquency variable and the time variable to test hypotheses 5a and 5b. Finally, in step (d), we controlled for differential effects according to the birth-order and gender composition of the sibling dyad. We interacted these dummy variables with sibling delinquency to see whether the effect of sibling delinquency on respondents' delinquency varies with birth-order or gender composition of the sibling pair, and to see whether this substantively changed our results.

Results

Descriptive Results

Before testing the hypotheses, we performed descriptive analyses to see how delinquent behavior develops over time in our sample. A random intercept for delinquency and random slope for the time variable were included in the model, without any further explanatory variables. Scores on the delinquent behavior scale linearly declined over time with an average of 0.093 ($SE = 0.011$) points per wave, starting from a mean level of 0.852 ($SE = 0.039$). Rate of change (variance = 0.022, $SE = 0.004$), and initial level

of delinquency (variance = 0.624, $SE = 0.063$) significantly varied between individuals. This means that there are significant differences in the levels of delinquent behavior between individuals in wave 1, and that the development of this behavior over time significantly varied between individuals. The higher an individual's level of delinquency in wave 1, the steeper his/her decline over time ($b = -0.084$, $p < .001$).

Overall Adolescence

The first set of models examines all waves together. The complete results from models 1a, 1b, 1c, and 1d are presented in Table 2. Model 1a includes the random intercept, the random slope of time, and the explanatory variables best friend's delinquency, parental support and warmth, and commitment to school, plus the control variables gender and SES. The level of delinquency in wave 1 (intercept) still varied significantly between individuals (variance = 0.488, $p < .001$) after including these variables, and so did the rate of change over time (variance = 0.021, $p < .001$). Parental support and warmth ($b = -0.143$, $p = .001$) and commitment to school ($b = -0.058$, $p = .001$) were

Table 2 HLM results of total adolescence model on delinquency, wave 1–6 (age 13–18) ($N = 417$)

	Model 1a		Model 1b		Model 1c		Model 1d	
Fixed effects	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)
Intercept	0.568**	(0.059)	0.534**	(0.062)	0.495**	(0.062)	0.561**	(0.078)
Time	-0.077**	(0.015)	-0.067**	(0.020)	-0.058**	(0.016)	-0.073**	(0.015)
BF delinquency	0.193**	(0.034)	0.189**	(0.035)	0.182**	(0.035)	0.187**	(0.035)
Parental support	-0.143**	(0.043)	-0.143**	(0.043)	-0.141**	(0.043)	-0.144**	(0.043)
School commitment	-0.058**	(0.018)	-0.058**	(0.018)	-0.060**	(0.018)	-0.057**	(0.017)
Male	0.191**	(0.058)	0.186**	(0.057)	0.186**	(0.057)	0.181**	(0.082)
Low SES	0.193*	(0.107)	0.198*	(0.107)	0.201*	(0.108)	0.206*	(0.106)
BF delinquency X time	-0.024**	(0.012)	-0.024**	(0.012)	-0.021**	(0.012)	-0.023**	(0.012)
Sibling delinquency			0.045*	(0.027)	0.106**	(0.042)	-0.015	(0.034)
Sib. delinquency X time					-0.027*	(0.014)		
Brother pair							-0.057	(0.094)
Sister pair							-0.048	(0.076)
Sib. delinq. X brother pair							0.117*	(0.064)
Sib. delinq. X sister pair							0.136**	(0.027)
Variance components	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)
Within-level variance	0.347**	(0.025)	0.348**	(0.025)	0.348**	(0.025)	0.347**	(0.025)
Between-level variance	0.488**	(0.082)	0.473**	(0.081)	0.458**	(0.079)	0.479**	(0.081)
Time slope variance	0.021**	(0.006)	0.020**	(0.005)	0.020**	(0.006)	0.020**	(0.006)
Covariance (int., slope)	-0.069**	(0.019)	-0.067**	(0.020)	-0.064**	(0.019)	-0.068**	(0.020)
Model fit								
AIC	4363.87		4362.13		4359.30		4362.18	
Deviance	4339.87		4336.13		4331.30		4328.18	

** $p < .05$; * $p < .10$

negatively related to delinquent behavior, as predicted by hypotheses 1 and 2. The best friend's level of delinquency was positively related to the respondent's delinquent behavior ($b = 0.193$, $p < .001$), as predicted by hypothesis 3, and this association weakened over time ($b = -0.024$, $p = .037$). To test the robustness of this result, we tested whether the number of times a respondent changed best friends over time moderated the association between the best friends' and the respondents' delinquent behaviors, but we did not find a moderation effect and other results did not substantially differ.

In model 1b, sibling delinquency was added to test hypothesis 4. Sibling delinquency was not significantly related to the respondent's delinquent behavior in this model ($b = 0.045$, $p = .095$), in contrast to what we expected in hypothesis 4, and therefore including sibling delinquency did not significantly improve the model ($\chi^2_{\text{Santorra-Bentler scaled}} = 2.523$, $df = 1$, $p = 0.112$). After including an interaction between sibling delinquency and time in model 1c, the main effect of sibling delinquency on respondent's delinquency was positive and significant ($b = 0.106$, $p = .012$). This indicates that sibling delinquency was positively related to respondents' delinquency in wave 1. The interaction term indicated that the association between sibling delinquency and delinquent behavior weakens over time ($b = -0.027$, $p = .054$), which favors hypothesis 5a over 5b. However, the inclusion of the main effect of sibling delinquency and the interaction with time together did not significantly improve the fit of the model ($\chi^2_{\text{Santorra-Bentler scaled}} = 5.913$, $df = 2$, $p = .052$). Since best friends' and siblings' delinquency were measured in a similar way, we could cautiously compare the coefficients. This suggests that adolescents' delinquency was more strongly associated with best friends' delinquency compared to sibling delinquency.

Next, we tested whether sibling similarity in delinquency was moderated by the birth-order and sex composition of the sibling pair. For easier interpretation, we tested these moderation effects in a model without the interaction term between sibling delinquency and time. We did not find a main effect or a moderating effect of sibling birth-order in this model, and these effects were also not present in the models for early and later adolescence.¹ Hypothesis 6a was therefore not supported. Because of limited space, we only present the model in which we added sex composition of the sibling pair in our tables. This new model is referred to as model 1d. The main effect of sibling delinquency was not significantly related to the target respondent's delinquent behavior ($b = -0.015$, $p = .648$) in this model. Sibling similarity in delinquency was, however, significantly stronger in same-sex sibling pairs ($b_{\text{sibling delinquency} * \text{brother pair}} = 0.117$, $p_{\text{sibling delinquency} * \text{brother pair}} = .065$; $b_{\text{sibling delinquency} * \text{sister pair}} = 0.136$, $p_{\text{sibling delinquency} * \text{sister pair}} = .027$). The effect did not significantly differ between brother pairs and sister pairs ($\Delta b_{\text{brother pairs vs. sister pairs}} = 0.019$, $p = .801$). Sibling delinquency did not have a significant effect on adolescents' delinquency in mixed-sex sibling pairs, but sibling

¹ As a robustness test for this result, we additionally controlled for age differences between siblings and included a three-way interaction with birth-order, age difference between siblings, and sibling delinquency. In this way we tested whether sibling delinquency is related to adolescents' delinquency when we take into account that the effect might differ between younger and older siblings, and between siblings who are close (less than two years) or far apart in age, simultaneously. None of the main effects or interaction terms were significant in any of our models. This is additional support for the claim that birth order of siblings does not moderate sibling similarity in delinquency in our sample.

delinquency did have a significant effect on adolescents' delinquency in both brother pairs and sister pairs (see Fig. 1). Hypothesis 6b is thus supported by these results.

Distinguishing Between Early and Late Adolescence

The results from the model for overall adolescence suggest a time-varying relationship between peer- and sibling delinquency on the one hand and adolescents' delinquent behavior on the other hand. In the next step of the analysis, the models described above were rerun for the period of early (i.e., wave 1–3) and later adolescence (i.e., wave 4–6) separately. In this way, we could explore the time-varying associations in more detail, by studying whether the effects differed between early and late adolescence. The complete results from models for early (2a–2d) and later (3a–3d) adolescence are presented in Tables 3 and 4. Three important differences between early and later adolescence were found in the results. First, the positive association between best friend's and respondent's delinquency did not vary significantly over the first three waves ($b = -0.033$, $p = .297$), whereas it did vary in the last three waves ($b = -0.057$, $p = .061$). This indicates that the positive association between best friend's delinquency and delinquent behavior remains stable in early adolescence, but decreases in later adolescence.

Second, the positive relationship between sibling delinquency and delinquent behavior decreased in the first three waves ($b = -0.078$, $p = .035$). When we included sibling delinquency and the interaction with time simultaneously, this significantly improved the initial model of early adolescence ($\chi^2_{\text{Santorra-Bentler scaled}} = 6.727$, $df = 2$, $p = .035$). The relationship between sibling delinquency and delinquent behavior was no longer significant in later adolescence ($b = 0.039$, $p = .276$).

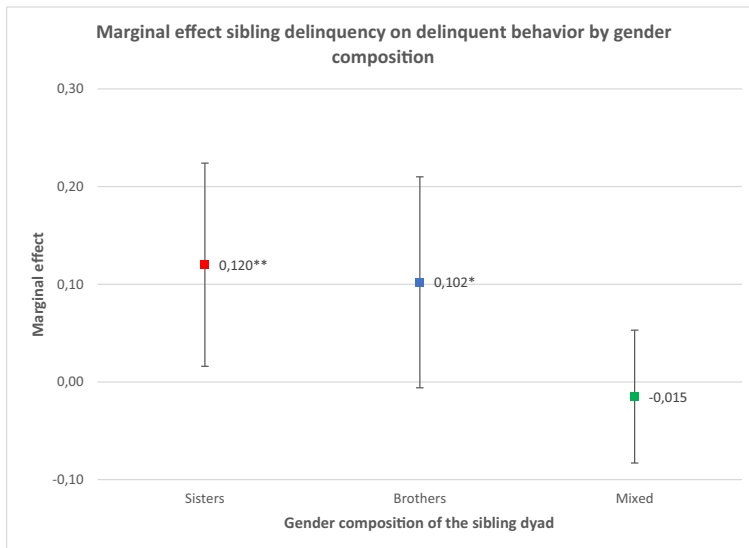


Fig. 1 Marginal effects and 95% confidence intervals of sibling's delinquency on delinquent behavior for brother pairs, sister pairs, and mixed-sex sibling pairs, in the overall adolescence model. ** $p < .05$; * $p < .10$

Table 3 HLM results of early adolescence model on delinquency, wave 1–3 (age 13–15) ($N=407$)

	Model 1a		Model 1b		Model 1c		Model 1d	
Fixed effects	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)
Intercept	0.567**	(0.073)	0.534**	(0.066)	0.453**	(0.077)	0.530**	(0.097)
Time	−0.125**	(0.040)	−0.152**	(0.027)	−0.072**	(0.045)	−0.124**	(0.040)
BF delinquency	0.200**	(0.045)	0.157**	(0.028)	0.180**	(0.046)	0.180**	(0.047)
Parental support	−0.233**	(0.059)	−0.228**	(0.057)	−0.223**	(0.057)	−0.226**	(0.057)
School commitment	−0.054**	(0.020)	−0.054**	(0.020)	−0.058**	(0.020)	−0.054**	(0.020)
Male	0.234**	(0.071)	0.224**	(0.070)	0.217**	(0.070)	0.199**	(0.098)
Low SES	0.380**	(0.176)	0.385**	(0.174)	0.374**	(0.175)	0.387**	(0.174)
BF delinquency X time	−0.033	(0.032)	−0.024**	(0.012)	−0.021	(0.032)	−.023**	(0.012)
Sibling delinquency			0.095**	(0.034)	0.167**	(0.053)	0.079*	(0.047)
Sib. delinquency X time					−0.078**	(0.035)		
Brother pair							0.043	(0.126)
Sister pair							−0.098	(0.096)
Sib. delinq. X brother pair							−0.021	(0.082)
Sib. delinq. X sister pair							0.124*	(0.070)
Variance components	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)
Within-level variance	0.312**	(0.029)	0.318**	(0.030)	0.317**	(0.030)	0.306**	(0.028)
Between-level variance	0.501**	(0.081)	0.470**	(0.078)	0.455**	(0.075)	0.493**	(0.078)
Time slope variance	0.072**	(0.025)	0.071**	(0.026)	0.067**	(0.026)	0.078**	(0.026)
Covariance (int., slope)	−0.101**	(0.033)	−0.095**	(0.033)	−0.086**	(0.032)	−0.106**	(0.033)
Model fit								
AIC	2435.78		2427.57		2424.60		2417.67	
Deviance	2411.78		2403.57		2396.60		2383.67	

** $p < .05$; * $p < .10$

Third, the association between sibling delinquency and delinquent behavior was the strongest for sister pairs ($b = 0.203$, $p < .001$), whereas it was only significant at a 90% confidence level for mixed-sex pairs ($b = 0.079$, $p = .095$), and not significant for brother pairs ($b = 0.057$, $p = .416$) in early adolescence. In the later adolescence model, we observed a contrasting pattern. The association between sibling delinquency and delinquent behavior was not significant for mixed-sex ($b = -0.057$, $p = .209$) or sister pairs ($b = 0.040$, $p = .642$), whereas it was significant for brother pairs ($b = 0.173$, $p = .008$).

This indicates that the association between sibling delinquency and the target respondent's delinquent behavior does differ with the gender composition of sibling pairs in early adolescence, as well as in later adolescence. In early adolescence, however, sibling similarity in delinquency was present among sisters, whereas in later adolescence, we saw this similarity only among brothers. This has substantive implications for our earlier finding that sibling similarity in delinquency disappeared in later adolescence. The results suggest that the opposite does apply to brother pairs. To illustrate this, Fig. 2 shows the marginal effect of sibling delinquency on delinquent behavior for all three gender compositions for both early and late adolescence.

Table 4 HLM results of late adolescence model on delinquency, wave 4–6 (age 16–18) ($N = 382$)

	Model 1a		Model 1b		Model 1c		Model 1d	
<i>Fixed effects</i>	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)	<i>b</i>	(<i>S.E.</i>)
Intercept	0.660**	(0.147)	0.634**	(0.148)	0.820**	(0.148)	0.679**	(0.154)
Time	−0.092**	(0.032)	−0.089**	(0.032)	−0.133**	(0.032)	−0.091**	(0.032)
BF delinquency	0.339**	(0.128)	0.330**	(0.129)	0.335**	(0.130)	0.316**	(0.127)
Parental support	−0.120**	(0.053)	−0.122**	(0.054)	−0.122**	(0.054)	−0.124**	(0.054)
School commitment	−0.071**	(0.025)	−0.070**	(0.025)	−0.070**	(0.025)	−0.067**	(0.025)
Male	0.163**	(0.065)	0.158**	(0.065)	0.148**	(0.064)	0.189**	(0.091)
Low SES	0.029	(0.104)	0.031**	(0.106)	0.031**	(0.147)	0.060**	(0.105)
BF delinquency X time	−0.057*	(0.030)	−0.055*	(0.030)	−0.056*	(0.031)	−0.052**	(0.030)
Sibling delinquency			0.039	(0.035)	−0.010	(0.149)	0.057	(0.045)
Sib. delinquency X time					0.013	(0.038)		
Brother pair							−0.218	(0.091)
Sister pair							−0.022	(0.090)
Sib. delinq. X brother pair							0.270**	(0.082)
Sib. delinq. X sister pair							0.083	(0.098)
Variance components	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)	Estimate	(<i>S.E.</i>)
Within-level variance	0.283**	(0.033)	0.282**	(0.034)	0.283**	(0.033)	0.283**	(0.033)
Between-level variance	1.574**	(0.496)	1.601**	(0.493)	1.595**	(0.493)	1.519**	(0.507)
Time slope variance	0.057*	(0.030)	0.058**	(0.030)	0.058**	(0.030)	0.054**	(0.031)
Covariance (int., slope)	−0.276**	(0.120)	−0.283**	(0.119)	−0.281**	(0.119)	−0.265**	(0.123)
Model fit								
AIC	2051.17		2051.82		2053.70		2041.61	
Deviance	2027.17		2025.82		2025.70		2007.61	

** $p < .05$; * $p < .10$

Discussion

The present study aimed at formulating and testing hypotheses about how sibling delinquency may affect adolescents' delinquent behavior over and beyond the influence of parents, school, and delinquent friends, and how this might change over the course of adolescence. Largely, the results suggest that delinquency of siblings is related to adolescent delinquent behavior, next to associations with traditional social domains, but that this relationship disappears in mixed-sex and sister pairs during adolescence, while increasing in importance among brothers throughout adolescence.

Bonds to parents and commitment to school were negatively related to delinquent behavior, which supported our hypotheses. The association between bonds to parents and delinquency appeared to be stable over the course of adolescence. This contrasts our theoretical predictions about a decreasing influence of parents over the course of adolescence, due to the fact that young people increasingly spend time in school and with peers over the course of adolescence. Our findings are in contrast with Hoeve et al.'s [7] conclusion that the association between bonds to parents and delinquency

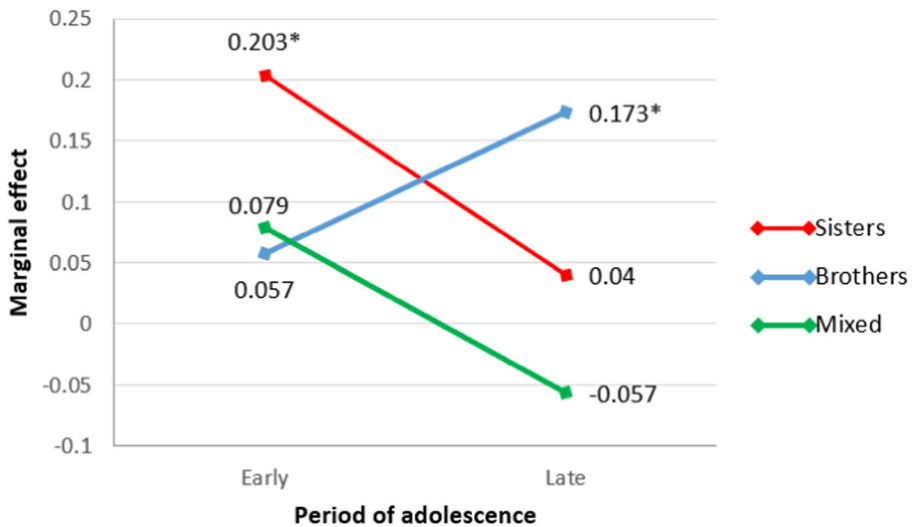


Fig. 2 Marginal effects of sibling's delinquency on delinquent behavior for brother pairs, sister pairs, and mixed-sex sibling pairs, in the early-adolescence model and the late-adolescence model. ** $p < .05$; * $p < .10$

weakens over the course of adolescence. An explanation for this difference could be that our operationalization of bonds to parents is, more specifically, a measure of parental support. Our results are in line with Jang's [33] findings about a time-stable association between bonds to the family and adolescents' delinquent behavior. The association between school commitment and delinquency was found to be stable over time as well, which contrasts with our theoretical predictions and Jang's [33] findings.

Best friends' delinquency was positively related to delinquent behavior, in line with our expectations. This association decreases in later adolescence, which is in line with Jang's [33] findings and potentially explained by newly emerging commitments to conventional activities and relationships (e.g., (side)jobs or romantic partners) that are partly taking over the role of peers in later adolescence [30, 32]. It is also in line with previous research suggesting that adolescents become increasingly resistant to peer influence between ages 14 and 18, because of developmental processes of identity development in late adolescence, which makes adolescents develop the need and ability to stand up to influence of their friends [29]. Relatedly, recent studies found that the cognitive-control system in the teenage brain matures over the course of adolescence, increasing adolescents' self-control, decreasing their inclination to engage in risky behaviors, and making them less susceptible to peer influence [54, 55].

Sibling delinquency was not related to adolescents' delinquent behavior in the six-wave model, in contrast to what we predicted. However, after taking a time-varying relationship into account, results suggested that sibling delinquency is positively related to respondents' delinquent behavior at age 13 (wave 1). The strength of this association appeared to decrease over time. To investigate the association between sibling delinquency and delinquent behavior in more detail, one set of HLM's was applied to the period of earlier adolescence (age 13–15), and one set of models was applied to later adolescence (age 16–18). From the results of these models, it appears that sibling delinquency is positively related to delinquent behavior in early adolescence, although the strength of the association decreases over time, and has disappeared when

respondents reach the age of 16. The finding that the association between sibling delinquency and delinquent behavior decreases as adolescents grow older is in line with previous research that compared sibling influence in adolescence to sibling influence in young adulthood [17, 34], but our study suggests that the effect disappears at an even earlier age. When we took into account gender composition of the sibling dyad, we found that sibling delinquency is only significantly related to adolescents' delinquency in same-sex sibling pairs.

In sum, sibling delinquency was shown to be related to adolescents' delinquent behavior in early adolescence, but not in later adolescence. This supports the first of our two competing hypotheses that predicted a decrease in importance of siblings because the amount of time siblings spent together in leisure activities over the course of adolescence also decreases [13]. This could imply less opportunities for social learning and less similarity in delinquent behavior between siblings over time.

We found no support for the hypothesis that sibling influence is stronger when the sibling is older than the adolescent, which is not in line with previous research on which we based this hypothesis (e.g., [19, 23]). However, it is in line with recent studies that reported bi-directional influences between older and younger siblings [17]. Samek et al. [34] also reported bi-directional influences between older and younger siblings, although only when siblings are close in age (approximately 1.5 years or less), but in our models age differences did not moderate the association between sibling delinquency and delinquent behavior. Further research is needed to clarify whether age-spacing and birth-order both interact with sibling delinquency to predict adolescents' delinquency.

After taking into account the sex composition of sibling pairs, results indicated that the pattern of decreasing sibling influence over the course of adolescence is especially salient in mixed-sex and sister-sister sibling pairs. In brother-brother sibling pairs, the opposite pattern was observed: sibling delinquency was not related to delinquent behavior in early adolescence, whereas it was in late adolescence. Our findings are in line with previous research suggesting that sister pairs and brother pairs both show notable similarity in delinquent behavior in adolescence [16, 56], but add that brothers' and sisters' similarity in delinquency develop in opposite patterns over the course of adolescence. Our findings are therefore supportive of previous studies' (e.g., [57]) claims that it is important to distinguish brother pairs from sister pairs, instead of grouping them together as same-sex sibling pairs as has been done in other studies.

These findings are supportive of prevention and intervention strategies targeted at the family, like functional family therapy, which was found to reduce delinquent behavior of siblings of initially referred delinquents who received the treatment [58], or multidimensional family therapy (e.g., Liddle et al. [59]). The current studies' findings suggest that such programs could utilize the important role sisters play for each other in early adolescence and brothers in later adolescence. The role of best friends in delinquency prevention seems to be even more important than the role siblings play, and delinquency prevention and intervention should focus on the friend network especially in earlier adolescence. Moreover, these programs should additionally focus on parental support and school commitment throughout the whole period of adolescence.

Why delinquency similarity increases for brother pairs from early to late adolescence, as opposed to sisters and mixed-sex pairs, is an interesting question for future research. These findings are in line with our alternative hypothesis that sibling

similarity in delinquency increases over the course of adolescence, since developmental differences may diminish and warmth and intimacy in the sibling relationship might increase. A possible explanation might be that the level of attachment between brothers increases between ages 13 and 17 [27], which might actually reflect that they engage in delinquent acts together, as previous studies suggest that brothers act as “partners in crime” in adolescence [16]. Relatedly, shared experiences are important for having a close relationship for boys, whereas for girls emotional disclosure is more important (e.g., [57, 60]). However, these are post-hoc speculations that were not explicitly tested in this study. Further research is therefore needed to investigate why sibling similarity in delinquency develops differently over time for brothers, compared to sisters and mixed-sex sibling pairs.

Limitations

As with any study, limitations can be identified for our study. The sample of respondents in this study is relatively well-functioning, indicated by a relatively high percentage of adolescents from high or medium SES households (89%). This percentage is significantly higher than in the Dutch population of adolescents [46], and is due to the study’s full-family design. Another indication of a relatively well-functioning sample is the linear decrease of delinquent behavior over the course of adolescence. This is not in line with some previous research that found a curvilinear pattern with a peak in middle adolescence (e.g., [33, 61, 62]). This could partly be explained by the fact that respondents who displayed higher levels of delinquent behavior, and who came from low socioeconomic status families were more likely to drop out of the study. In sum, further research should try to incorporate a more diverse sample in terms of delinquent behavior and family background to make the results more generalizable to the total population of adolescents in the Netherlands.

Further, it would have been interesting to study whether the degree of genetic relatedness is associated with behavior similarity between siblings, and whether our results are robust to including genetic control variables (see, e.g., [63]). However, our final sample of analysis only includes between 14 (in wave 1, i.e., 4.15%) and 5 (in wave 6, i.e., 1.83%) sibling pairs per wave that are not fully biologically related. We also have no additional information about the biologically related siblings, for example about whether they are twins and, if so, what type of twins. Altogether, this makes it impossible to meaningfully control for the degree of genetic relatedness within sibling pairs in our multivariate analyses. Future research may benefit from incorporating a more diverse sample in terms of sibling pair composition to investigate the role of genetic relatedness.

Our operationalization of peer delinquency and sibling delinquency is limited, since respondents might have multiple siblings and (best) friends, while we only have information about one of them. To be able to investigate time-varying effects of friends and siblings, it is worthwhile for future research to include information about multiple siblings and friends in the model. It may, for example, be possible that the influence of the best friend indeed decreases over time, but that this is partly replaced by influence from a larger peer group. The same mechanism could apply to sibling influence. Our

measure of bonds to parents does only cover part of the concept defined by Thornberry [30], and is, more specifically, a measure of parental support. It is possible that we did not find a time-varying association between bonds to parents and delinquent behavior, since our measure is more narrow and does, for example, not cover the extent to which parents are able to monitor and discipline their children's behavior.

We only tested the dyadic similarity in delinquency between siblings, and left possible underlying mechanisms unexplored. According to previous research, similarity in siblings' delinquent behavior can be explained by several mechanisms. First, the majority of the similarity in criminal behavior between siblings is accounted for by genetic factors [64, 65]. Second, siblings share within-family influences (i.e., socialization environment), like parenting, exposure to poverty [64] and family cohesion [66], which could also partly account for behavioral similarities between siblings. Although parental support and warmth was included in our analyses, from the family systems perspective [66, 29], it could be argued that functioning of the family as a whole has implications for adolescents' behavioral problems, beyond those accounted for by dyadic family relationships. Our understanding about sibling influence on adolescents' delinquent behavior could therefore benefit from further research controlling for a measure of family cohesion, or family functioning as a whole (see, e.g., [67]), or by controlling for the fact that siblings are clustered within families. Third, sibling similarity in delinquency may be the outcome of negative interactions between siblings, or sibling similarity in delinquency might be moderated by the relationship quality, which we did not account for in our analyses. However, negative interactions between siblings were not found to be related to delinquent behavior in a previous study by Defoe et al. [23] who used (part of) the same dataset.

Although future studies would benefit from taking these mechanisms into account, previous research found that siblings' behavioral similarities exceed the shared genetic and environmental influence, which suggests that social influence is important as well. For example, modeling of behavior moderated the link between the older sibling's deviant behavior and the same behavior in the younger sibling 2 years later [18, 42]. Whether or not the decrease of dyadic social influence in mixed-sex and sister pairs over the course of adolescence could be explained by a decrease in time siblings spent together was not explicitly tested in this study, and is an interesting question for further research.

Conclusion

Notwithstanding the limitations mentioned above, the current study has contributed to our insights in multiple ways. First, we find support for interactional theory's assumption that the relative importance of the family and peers change over time. We did not find a change in the role of parental support and warmth, but we did find a decrease of sibling similarity in delinquent behavior during early adolescence, while the influence of the best friend only seems to decrease in later adolescence. Taken together, these results suggest that the *relative* influence of the best friend compared to sibling influence does increase in early adolescence, which could be a result of spending more time outside the family and more with friends. Second, adding siblings' delinquency to the model to explain adolescents'

delinquent behavior proved to be useful. Our results suggest that siblings' behavioral influence explains part of adolescents' behavior in early adolescence in sister pairs, and in later adolescence for brother pairs, beyond the influence exerted by peers, parents, and school, and should therefore not be neglected in further research and policy interventions aimed at adolescents' delinquency. This implies that further research could benefit from a more detailed assessment of influence of different family members on adolescents' delinquent behavior over time, rather than mainly focusing on relationships with parents.

Third, by distinguishing between the period of early and later adolescence, and by gender composition of the sibling dyad, we got a more detailed insight in relative influences of siblings over time. Based on the main effect of sibling delinquency in the total adolescence model, we would have concluded that it is not related to adolescents' delinquent behavior. However, through distinguishing between early and later adolescence, and between different gender compositions of sibling dyads, we conclude differently. Namely, that siblings' behaviors are related to adolescents' delinquency in early adolescence, especially among sisters, whereas in later adolescence similarity in delinquency is especially salient among brothers.

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Affiliations

Twan Huijsmans¹ • Veroni I. Eichelsheim² • Frank Weerman^{2,3} • Susan J. T. Branje⁴ • Wim Meeus^{4,5}

¹ Faculty of Social Sciences, Department of Sociology, VU University Amsterdam, Amsterdam, the Netherlands

² Netherlands Institute for the Study of Crime and Law Enforcement (NSCR), Amsterdam, the Netherlands

³ Criminology Department, Erasmus School of Law, Erasmus University, Rotterdam, The Netherlands

⁴ Faculty of Social Sciences, Department of Youth and Family, Utrecht University, Utrecht, the Netherlands

⁵ Department of Developmental Psychology, Tilburg University, Tilburg, the Netherlands